

L1 reading experience modulates reliance on a linguistic cue in L2 pronoun processing

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INTRODUCTION A critical question for psycholinguistic research is how the input shapes language processing mechanisms. Previous research suggests that written input significantly influences spoken language processing. In particular, Strangmann et al. (2016) showed that when linguistic (subject bias) and paralinguistic cues (gazing and pointing gestures) compete for pronoun resolution, speakers with greater print exposure tended to rely on the subject bias more than those with less print exposure. For example, in *Ana is playing tennis with Liz. She needs a racket*, they were more likely to interpret the pronouns as referring to the subject (*Ana*). This finding raises a critical question about speakers of more than one language -- *Does reading experience in one language affect spoken language processing in another language, or does it have a language-specific effect?* The answer to this question holds important implications for the nature of reading experience and the interactivity of two languages under a single cognitive system.

Much evidence suggests that L1 knowledge influences L2 processing -- even during language-specific processing -- at syntactic (e.g. Hartsuiker et al., 2004), phonological (Hermans et al., 1998), and lexical levels (Marian & Spivey, 2003). Yet, it is not clear how two languages interact beyond phonological, lexical and syntactic levels. Here we test how L2 discourse processing, namely ambiguous pronoun resolution, is influenced by bilinguals' print exposure in L1 and L2. If print exposure is specific to experience with the specific words (*he, she*), we would only expect a language-specific effect of reading experience, i.e. L1 reading experience should not influence L2 pronoun resolution. Yet, reading exposure may be important because it helps individuals develop general processes for understanding connected texts, and representing information structure. If so, we predict that L1 reading experience should influence L2 pronoun resolution. To evaluate these predictions, we examined how Mandarin-English bilinguals' reading experience in Mandarin and English influences their interpretation of English pronouns.

EXPERIMENT We recruited 62 Mandarin-English bilinguals with intermediate or advanced level of English proficiency (IELTS score of 6 or above). We measured print exposure with an author recognition task in both Chinese (Sze et al., 2014) and English (Acheson et al., 2008) as well as self-report print exposure scores. Pronoun interpretation was tested with the video task from Nappa and Arnold (2014). Participants watched a woman telling a story about two same-gender characters (*Puppy is cleaning up with Panda Bear. He wants the broom.*). The pronoun was accompanied by (a) gazing at the subject, (b) neutral gazing, (c) gazing at the non-subject, (d) pointing at the subject, (e) neutral pointing, and (f) pointing at the non-subject (Fig. 1). After critical videos, participants were asked a question that assessed pronoun resolution (*Who wants the broom?*).

RESULTS The pronoun task replicated previous findings in English. Mandarin-English speakers were sensitive to both the linguistic (subject bias) and paralinguistic cue (gazing/ pointing) (p 's $<.05$): gazing or pointing at the subject enhanced the subject bias (85% to 95%), whereas gazing or pointing at the non-subject decreased it (gazing to 50%, pointing to 15%). Crucially, *the likelihood of choosing the subject was significantly modulated by Chinese ART scores but not English ART scores* (Fig. 2) ($p<.01$), even though the two ART scores were correlated ($p<.001$). Self-report measures of print exposure in English also did not have any effect ($p>.6$). That is, print exposure in L1 influenced bilinguals' reliance on a linguistic cue in L2 pronoun processing. Our results suggest that the influence of reading experience is not language-specific, and reading and spoken language processing are closely related in L1 and L2. Theoretically, our findings (a) support bilingual processing models in which two language systems are highly integrated and (b) suggest that the effect of reading exposure on pronoun comprehension stems from the role of experience on general discourse processing strategies.

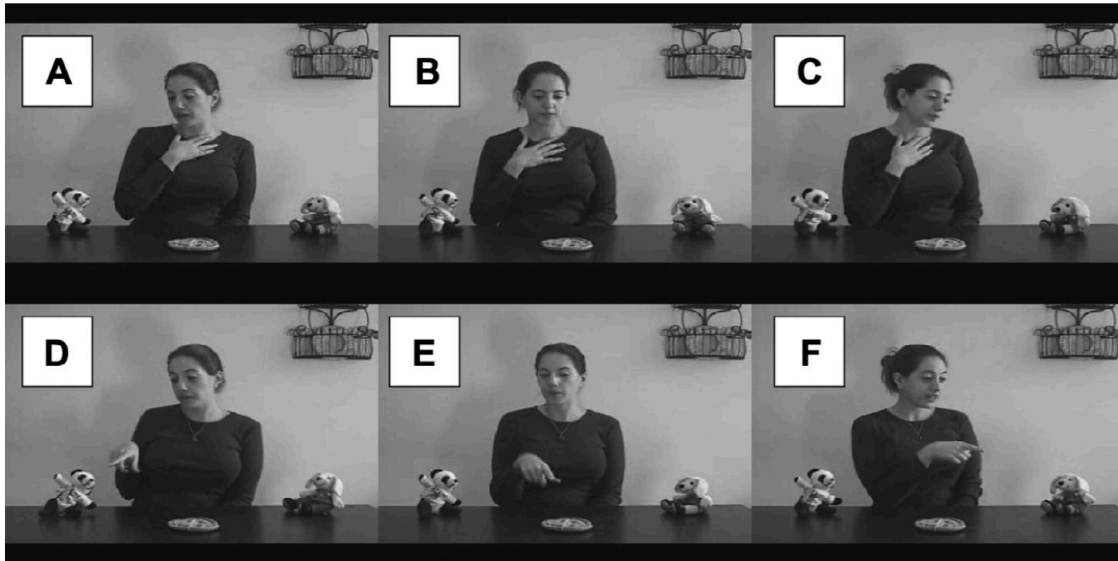


Fig. 1. Conditions in the task: (A) Gaze to N1, (B) Neutral gaze, (C) Gaze to N2, (D) Point to N1, (E) Neutral point, (F) Point to N2.

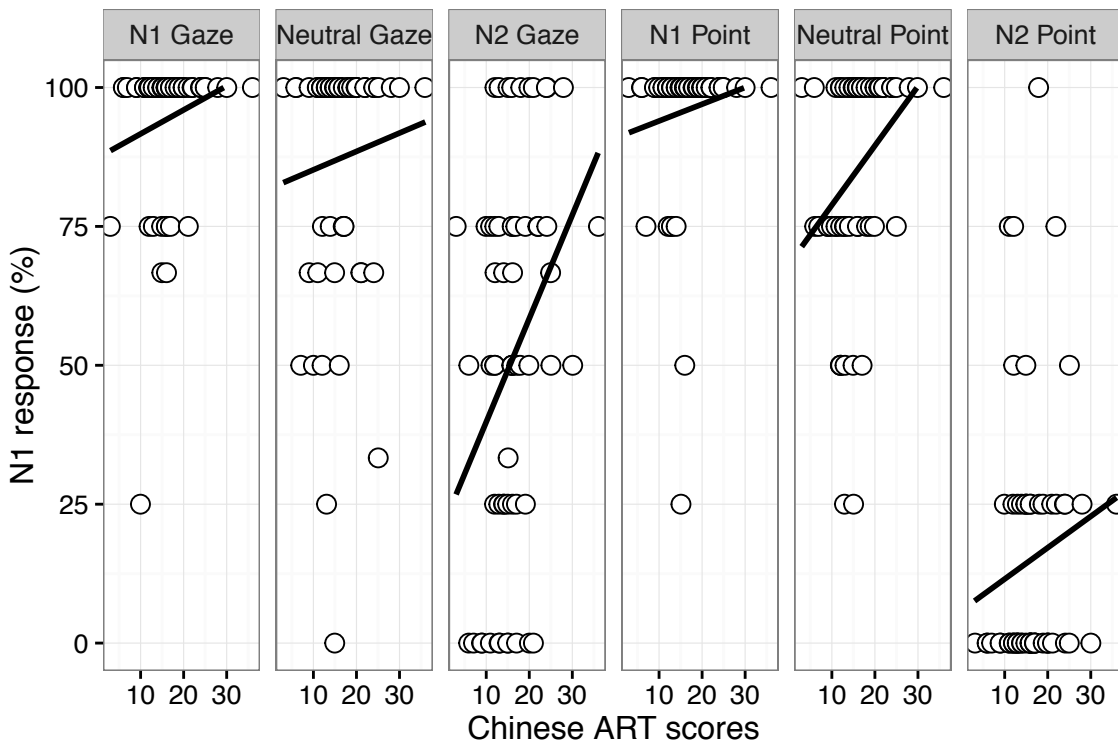


Fig. 2. Per-participant N1 (Subject) responses as a function of Chinese ART scores in each cue condition. The solid line indicates a regression line between N1 response rates and Chinese ART scores.